

Summer 2018

# Will An Environmental Focused Genius Hour Affect Students' Attitudes Toward The Environment?

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WILL AN ENVIRONMENTAL FOCUSED GENIUS HOUR AFFECT STUDENTS' ATTITUDES  
TOWARD THE ENVIRONMENT?

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A capstone submitted in partial fulfillment of  
the requirements for the degree of Master of Arts Education:  
Natural Sciences and Environmental Education

Hamline University  
Saint Paul, Minnesota  
Summer 2018

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## CHAPTER ONE

### Introduction

In my Civics and Citizenship class I have assigned a passion project called Genius Hour. It is a student-led, inquiry project in which students choose topics that interest them in the attempt to answer a problem in society. This year long project includes extensive student research and concludes with a final formal presentation of the information they have obtained. Over the last three years I have asked myself, *will an environmental focused Genius Hour affect students' attitude toward the environment?*

### Overview

The introduction of this capstone is composed in three parts: background, rationale, and data analysis-the first part gives some background information into my life- including my environmental history, my experience teaching and the role genius hour plays in my classroom. The second part talks about the rationale for research into environmental stewardship. The final part includes a summary of chapter one in addition to a preview of chapter two.

### My Researcher Background and Teaching Experience

In order to understand my current viewpoint and beliefs it is important to know my background and experiences. This section includes my background and explains my environmental experience. It also gives insight to my time as a teacher. The final parts take a look at Genius Hour and my rationale for including Genius Hour into my classroom.

## **My Environmental Experience**

Growing up in a suburb of the Twin Cities, I had a large yard with trees. The grass was always green, lush and cut low. I spend all summer barefoot in that yard playing night games with my neighbors. My father worked for the Department of Natural Resources and some days he would bring home wounded animals on his way to the animal sanctuary. I saw geese, owls, eagles, fawns, raccoons, and even a bear! My dad would bring me to work sometimes and we would go to state parks. Meanwhile at school, I enjoyed science classes. Learning about recycling, the rain cycle and raising a crayfish in elementary school was just the start. The natural science curriculum in high school challenged me to further examine weather, climate, geology, plate tectonics, and the universe. My fascination with nature and its workings continued to grow. I enrolled in Hamline University's environmental education masters program because I already had an undergraduate degree in education. I wanted to be a student again; I wanted to learn about something new. My curiosity was piqued again. I loved every single class I took. However, the part I loved the most was the human connection to the environment that existed: how humankind has changed the landscape of the Earth to fit it's needs; how humans engage in conflict to gain access to natural resources; and the passion people have to bring about positive change to the environment. I am not and will never be a hermit who lives in the woods, with a farm, making all of my own food, medicines, and clothes. I will always live in a city; I will always drive a car. However, I have gone to more national parks since joining this graduate program. The classes have inspired me to be more conscious of my choices. My choice of what foods I eat, the choice of what clothes I buy, what companies I buy products from all add up to big impacts. This is where I lie when it comes to environmental activism, and I know it will only grow with time as I become more aware of the positive choices I can make.

## **My Time As A Teacher**

I finished my fourth year of teaching full time this year. My mother was a teacher and on my cul-de-sac growing up five of my female neighbors were teachers. Teaching was something I had wanted to do since my junior year of high school. My teaching career has now brought me full circle as I teach in the same district that I gained my K-12 education from. My licensure is 5-12 social studies. I have taught American Government, World History, Global Studies, and Civics and Citizenship. Social studies has amazing curriculum because it has so many different subject strands woven into it. It has social sciences to help explain how people interact with one another and within society. It has geography, which allows discussions about how humans are tied to the land. Economics allow people to discuss the role that scarcity plays in people's lives and finally history, which examines the past. The course I have taught the longest is Civics and Citizenship. It examines American government, and the rights, responsibilities and duties of American citizens. Quite frankly, it is one of the most important classes high school students will take before they graduate because regardless of what path students take after their four years, whether they go to college, join the workforce, enlist in the military or even students who do not graduate, they will all be members of the electorate. They will be the ones that politicians, interest groups and lobbyists vie for to get their support. It is important for those students to know their power in the great game that is democracy.

## **Genius Hour**

Genius Hour was added into my school's Civics and Citizenship curriculum three years ago. It is a student-led, inquiry project in which students identify a problem in society and try to solve it. Popular topics from the past years have been obesity, animal rights, cancer, the benefits of participation in sports

and bullying. Students conduct their own research using scholarly sources from databases to learn as much as they can about their topic. After 12 weeks of research, students spend another 12 weeks creating a method of presentation for their societal problem. Student's final presentations can vary: students have made websites, videos, social media accounts, and even a handmade cookbook! Students are given a calendar with work days clearly identified and are allowed to choose how they use their time during these work days. They may choose to film, conduct interviews, continue research or create part of their project. Students deliver their final presentations to their classmates, in which they share the information that they have gathered and explain why they chose the method of presentation they did. They also answer questions that their classmates might think of during the presentation of the Genius Hour topic.

### **Rationale for Genius Hour**

Civics and Citizenship can be a challenging course for students. My students are 13 or 14 years old when they come into my civics and citizenship classroom. It is a vastly different class than the social studies classes they had in their previous years, such as American History and Global Studies because it is no longer theoretical. Civics and Citizenship looks at the rights and responsibilities of American citizens and how American government works. Civics and Citizenship has many vocabulary words, complex theories, and questions that have yet to be answered. Many times students have a hard time connecting to American government; they are not yet of voting age and they feel no personal connection to government leaders or the American institution itself. As a way to make students feel more connected to the subject matter, Genius Hour was introduced into the curriculum. Genius Hour self-directed unit of study, and is also a break from the government curriculum. It allows students to pick a topic of their choice and explore it over the course of an academic year. However an important part of being a citizen



is the responsibility of contributing to the common good. This is the overarching theme of Genius Hour- identify an issue in society and try to solve it. Would students who identified an issue linked to the environment have a change in attitude toward the environment? This question made me want to look further into the role of Genius Hour in my classroom.

### **Rationale for Research**

The second part of this chapter explains why this topic was chosen as my capstone. It explains the importance of student research and their self-directed passion projects. This section will conclude with my prediction of how students environmental stewardship will be impacted and how my Genius Hour project can be improved upon to benefit all students.

### **Why this topic?**

Humankind is at a very important place right now. There is no question that environmental issues are some of the biggest concerns to multiple generations across the globe. We need as many global citizens as possible to take part in a grand environmental conversation regarding solutions for the benefit of all.

### **Purpose Of My Research**

If I am to continue requiring students to participate in Genius Hour, I want to know the effects that it has on them. That is why this capstone will focus on the driving question, *will an environmental focused Genius Hour affect students' attitudes toward the environment?* My goal is that students who have an environmental issue to solve will become active participants in their topic and become apart of the solution instead of continuing as a bystander.

## **Expectations**

I expect students who have environmental topics will become environmental stewards compared to students who do not have environmental topics. I expect students with environmental topics will place higher importance on the environment than students without an environmental-issue focus.

## **Summary of Chapter One**

I want to see if an environmental focus during Genius Hour will lead to more students becoming environmental stewards. I want to see if a student's thoughts, attitudes and beliefs about the environment change after researching an environmental issue.

## **Preview of Chapter Two**

In Chapter Two, I will investigate research about passion projects and their effects on students learning and beliefs. Additionally, I will look at attitudes toward environmentalism based on gender, race, and other indicators. I will finish Chapter Two with a literature review of passion projects and how it can be applied to my capstone.

## CHAPTER TWO

### Literature Review

#### Introduction

The second chapter of this capstone covers literature that relates to my research question, *will an environmental focused Genius Hour affect students' attitudes toward the environment?* The purpose of this chapter was to help me better understand motivation, the role it plays in project-based learning, and how to foster environmental stewardship. Therefore, I selected literature that examine project-based learning.

Research on Genius Hour was not as available. Genius Hour is something of a recent trend from the past five years. I struggled with finding studies relating to the affect that Genius Hour has on students. The majority of the literature found focused on how to structure a Genius Hour project in a classroom instead of data supporting the trend.

Project-based learning research contained a lot of information about the skills students gain while completing these types of projects and how these skills will be more helpful to them in the future compared to other types of learning. The evidence demonstrates that Project-based learning is more effective than other types of learning at teaching students these skills. In the 21st century employers are looking for the types of workers with different skill sets than previous work forces, and research shows that project-based learning allows students to become masters of these skills.

There was much more research available regarding students' attitudes toward the environment. There have been many studies of how environmentally focused projects, such as gardens, or environmentally focused classes improve environmental attitudes. There is also a wealth of knowledge

in the field of environmental psychology, which was established during the 1960s, around the same time that the environmental movement took place in the United States and across the globe.

The relevant literature on motivation focused on the difference between intrinsic and extrinsic motivation and how that differential motivation affects students. Pink's *Drive* was particularly helpful by focusing on what truly motivates people and how giving rewards or bonuses can often have an unexpected adverse effect (Pink, 2009). In conclusion, the literature provided a stepping stone to conduct my own research.

## **Overview**

The literature review starts with the origins of Genius Hour and its birth in the business sector of American society. It then looks at how Genius Hour came into the world of education, and, finally, why research of Genius Hour in the classroom is important.

The second section examines project-based learning with a generally accepted definition of the term, along with the benefits to student learning from project based experiences. It will also explain how the skills needed to participate in project-based learning will benefit the future workforce and the American economy.

The third section examines motivation and the role it plays in human lives. It will take a look at the different types of motivation along with a general definition of the term. Further, it will focus on how motivation affects students and what researchers suggest teachers do to increase motivation in their own students.

The fourth section focuses on attitudes toward the environment and features ways that public and private groups have tried to increase environmental awareness along with how schools have incorporated environmental education into their curriculums. It will also look at environmental

psychology, people's attitudes and values toward the environment and how that affects and shapes behavior.

The final section will summarize Genius Hour, project-based learning, motivations and attitudes toward the environment. It will conclude with a preview of the next chapter-methods.

### **History of Genius Hour**

This first section looks at the history of Genius Hour and where it first originated. This section also includes how Genius Hour has moved from the business world into the realm of education. This section concludes with an explanation of why the history of Genius Hour is important in regard to my research.

*Origins of Genius Hour.* Genius Hour is another name for 20% Time. 20% Time refers to the time, about 20% of the normal work week, employers give to their employees to conduct projects or research that interest them and that will ultimately benefit the company. While it is disputed as to who is the originator of 20% Time, lots of credit is given to Google. In fact, Google has boasted of a number of things created during this 20% time such as "Gmail, Google News, Orkut, Google Sky, Google Talk, and AdSense. Marissa Meyer, Google's former Vice President of Search Products and User Experience (and current Yahoo! CEO) has said that 'half of new product launches had originated' in this 20% Time" (Juliani, 2014). At its core, 20% Time at Google is to "promote innovation and cross-department collaboration between programmers" (Juliani, 2014). However, while many have given Google the credit, the 20% Time idea goes back further to the company named 3M. The company, in 1948, started a program with the belief that "employees should have 15 percent of their time to follow up on" an idea that sparks interest for them. One of the most famous products to come from this 15% Time is 'Post It Notes.' Developed in 1974 by Art Fry, Post-Its have been joined by clear bandages, optical films that

reflect light, and painter's tape as products created in 3M's 15% Time" (Juliani, 2014). The success of 20% Time is clearly seen in the business world through the many inventions created.

*20% Time Moves into Education* There has never been a time in American history in which the U.S. public education system has not been examined. Trends have come and gone and for better or for worse one major idea circulating is that students are no longer allowed to be creative. In fact Sir Ken Robinson, a British educationalist, argues that:

“Public schools were not only created in the interests of industrialism—they were created in the image of industrialism. In many ways, they reflect the factory culture they were designed to support. This is especially true in high school, where school systems base education on the principles of the assembly line and the efficient division of labor (2006).”

Since many involved in the education world agree with Sir Robinson that creativity is absent in schools, teachers, administrators and other meaningful stockholders have attempted to include meaningful opportunities for creative exploration in schools. One of these opportunities is Genius Hour. While Genius Hour differs depending on the teacher implementing it, there are common themes that are generally universally accepted. Genius Hour should be connected to academic standards, allow students choice in their subject and conclude with students sharing their findings.

*Why is the history of Genius Hour and its literature important?* Researching Genius Hour is important because it is relatively new to the education world. Within the last five years Genius Hour has become a popular activity for educators to include in their classrooms. Literature that investigates the benefits of Genius Hour is helpful to the overall research question.

## **Project-Based Learning**

The second section of this chapter looks at the literature that contains definitions of project-based learning. The second half of this section analyzes the benefits students have when they participate in project-based learning.

*Definitions of project-based learning.* “Problem-based learning originated in the medical field and reflects student-centered collaborative learning centered on an ill-structured problem (Goodnough & Cashion, 2006; Savery, 2006; Walker & Leary, 2009) There are many different definitions of project based learning when set in the realm of education. Tal, Krajcik and Blumenfeld (2006) define it as:

A context that engages students in extended authentic investigations through a driving question, collaborative work that allows students to communicate their ideas, learning technologies to find and communicate solutions, and the creation of artifacts that demonstrate student understanding and serve as the basis for discussion, feedback, and revision. (p. 724)

However The Buck Institute of Education argues that in order for project-based learning to reach a “gold standard” there must be two added characteristics to the above mentioned definition. First, students must be allowed input and choice on their project, and second, students must be given the opportunity to revise, critique and edit not only their work but the work of their classmates (2015). Lastly, Holm (2011) defines project-based learning as “student-centered instruction that occurs over an extended time period, during which students select, plan, investigate and produce a product, presentation or performance that answers a real-world question or responds to an authentic challenge” (p. 1).

*Benefits of Project-Based Learning for Students.* Passion projects are an example of project-based learning. In Andi McNair’s (2017) book, *Genius Hour*, she argues that passion projects are some of the best ways for students to learn information in a meaningful way. Passion projects give

students an opportunity to learn by doing. Application of the standards is the best way for students to gain understanding. By applying the standards, they begin to see real-world connections and understand that their learning can go beyond the walls of the classroom (p. 6).

Passion projects allow students to learn on multiple levels, through the simplest, like knowing facts, to the most complex, like evaluating whether an idea will intrigue people or not. Benjamin Bloom, a doctor of education, created Bloom's Taxonomy with this concept in mind. This taxonomy contains six levels of learning in the following order, knowledge, comprehension, application, analysis, synthesis and evaluation. "The categories were ordered from simple to complex and from concrete to abstract." (Krathwohl, 2002, p. 212) Genius Hour starts with an issue. Students begin at the lowest level, knowledge, but with time students will visit multiple levels based on their level of investigation and critical thinking.

Education is drastically changing. No longer is it expected for students to sit in their desks, quietly taking notes for eight hours a day. Students are expected to think critically, ask good questions and collaborate. Employers are actively searching for different potential workers. Juliani (2015) shares in the book *Inquiry and Innovation in the Classroom*:

The US Department of Labor prediction that kids in high school will have had 10-14 different jobs by the time they're in their late thirties, and that 65 percent of our grade-school kids will end up in jobs that haven't yet been invented. Other students who that by 2020, over half of the workforce will be consultants, freelancers, and independent contractors, cobbling out their own careers. (p. 4)

Students need to be able practice the skills that are demanded in the 21st century. Students must be given the opportunity to succeed and fail inside the classroom so that they are not afraid to do so outside.



Students who participate in Genius Hour practice skills desired by companies throughout the world. *Forbes* magazine published an article titled “10 Skills Employers Most Want in 2015 Graduates” which included the following:

The ability to plan, organize and prioritize work, the ability to obtain and process information, the ability to analyze quantitative data, technical knowledge, proficiency with computer programs, the ability to create and/or edit written reports; and the ability to sell and influence others (McNair, 2017).

McNair argues that Genius Hour, an example of project-based learning, allows students to practice all of the skills employers are looking for. McNair offers the six P’s” passion, plan, pitch, project, product and presentation. The first step, passion, allows students to become self-aware of what they want to pursue. The second step is planning, in which students prioritize decisions and tasks. The third step is pitch- students must share their plan in addition to giving feedback to peers. The fourth step is project where students collaborate with students and outside experts to complete the fifth step which is product. Students create something to share what they have discovered and learned during the previous four steps. The final step is presentation. This allows students to work on their communication skills when they present their product to an audience (McNair, 2017, p. 15). Juliani mentions that:

Edutopia reports that, ‘additional research has documented improvements in motivation, attitude toward learning, and work habits. Students who struggle in traditional instructional settings have often excelled when working on a project, which better matches their learning style or preference for collaboration.’ Projects can serve as the platform for the other patterns of innovation to co-exist and connect” (2015, p.30).

*Service Learning.* Service learning is when students complete community service in addition to any learning in the classroom. There are many benefits for students who participate in service learning projects. One research study found that participation in service learning showed positive effects on the following: academic performance, values, self-efficacy, leadership, choice of a service career, and plans to participate in service after college. (Austin, Vogelgesang, Ikeda & Yee, 2000) The same study also found that the “single most important factor associated with a positive service-learning experience appears to be the student's degree of interest in the subject matter” while the second most significant factor in a positive service-learning experience is whether the professor encourages class discussion.” (Austin, Vogelgesang, Ikeda & Yee, 2000, p. 3) Service learning is also believed to increase engaged citizenship in people. “An important aspect of the service-learning project is sharing the learning with others.” (Oyler, 1999, p. 144) Since service-learning incorporates community service it allows students in a Civics and Citizenship class to see one of the most important responsibilities of a U.S. citizen in practice, contributing to the common good.

### **Motivation**

The third section of chapter will look at motivation. Definitions will be compared along with looking at how motivation affects students. Finally, ways that teachers can increase motivation in their students will be examined.

*Motivation Definition.* The root word motive is defined as “something (such as a need or desire) that causes a person to act.” (Merriam-Webster) In addition to the broad definition of motivation, (the act of motivating) there are two types of motivation, intrinsic and extrinsic. “Intrinsically motivated behaviors are those that derive from interest, thus are performed for pure pleasure and desire. They are self determined and require no reinforcements or rewards to be maintained” (Deci and Ryan 2000).

(2014, p. 295) While extrinsic motivation “behaviors are performed for rewards or some external outcome” (2014, p. 296) .

In the book *Drive*, Pink (2009) argues that humankind has had two types of motivation, Motivation 1.0 and 2.0. Motivation 1.0 existed during early human history when the prime motivating factor was to survive. Pink explains that once complex civilizations were established, Motivation 1.0 had to be restrained because now humans were dependent on others in order to survive. Motivation 2.0 came along with the Industrial Revolution. Pink argues that Motivation 2.0 centers around the idea that humans reward the action they seek and punish the actions they want to avoid.

Researchers examine the difference between primary and selective motives in the context of motivation. Primary motives let people “engage in a whole set of behaviors” while selective motives “influence one specific action” (Kollmus and Agyeman, 2002, p. 250) An example of this would be driving to work versus riding a bike. The primary motive is to have a more positive impact on the earth, while the selective motive is choosing between riding a bike versus driving a car. However there are barriers to motivation. Barriers could consist of many things such as time, money, and convenience. If the weather forecasted rain, people may be less likely to bike because they would be uncomfortable. If a bike ride would take twice the amount of time as a car ride would, some people may choose to drive because they value their time more than the environment.

*Motivation and Students.* A study done by Lepper, Greene and Nisbett demonstrates researchers observed what happened to preschool students when given the choice to draw. One group was told they would receive an award for drawing. A second group would also receive an award, but they would not be told ahead of time about it. The last group received no award. The researchers returned to the classroom two weeks later. The students in groups two and three participated just as much as they had

before the experiment while students in the first group did not. Pink argues from this experiment that play had turned into work for the first group. (Pink, 2009)

Another group of researchers, Deci, Ryan and Koestner, examined effects motivation has on students. They concluded that

... tangible rewards tend to have a substantially negative effect on intrinsic motivation,' they determined. 'When institutions-families, schools, businesses, and athletic teams, for example-focus on the short-term and opt for controlling people's behavior,' they do considerable long-term damage (Pink, 2009, p. 37)

In fact, research shows that intrinsic motivation is better than extrinsic motivation. Lepper, Corpus and Iyengar (2005) conducted a study comparing intrinsic and extrinsic motivations with students. At the end of the study they found that students who were intrinsically motivated scored higher, no matter the grade level. When looking at activities related to the environment, "children themselves assess why they engage in projects to improve the environment, the intrinsic pleasure of interesting and meaningful activities with friends figures high on their list of reasons. (Chawla, 2009, p. 10) This is not surprising as humans are social creatures and crave acceptance and belonging with other humans, especially as young children and again as teenagers.

*Ways to increase motivation.* As the above section revealed, one of the best ways to increase motivation in students is to instill a sense of intrinsic motivation. Pink (2009) argues that giving students the opportunity to become a teacher is another way to instill motivation because "one of the best ways to know whether you've mastered something is to try to teach it" (p. 196). Another way to increase motivation is to allow students choice. Project-based learning (section two of this chapter) requires students to self-select topics of interest. When a student is allowed to take ownership of a project, they

are more likely to see it through and be more involved. This attainment value, whether students believe the activity is personally meaningful, is important to consider. (Chabla, 1999) Students often have very little choice in terms of their education. The curriculum is set by teachers and politicians. Attainment is important to consider because it can be an important factor in student success.

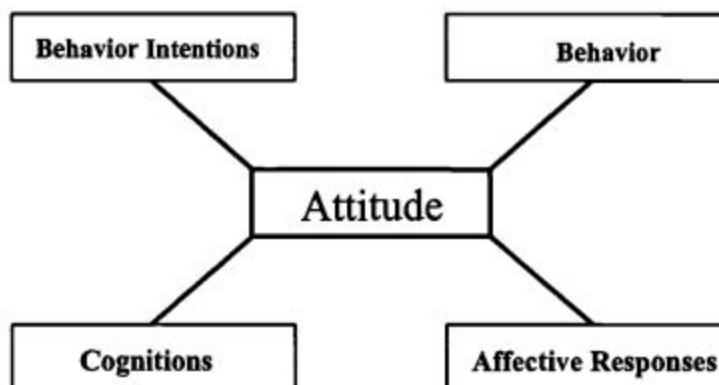
### **Attitude Toward the Environment**

The fourth section of this chapter examines literature about attitudes towards the environment. First, a definition will be important so that all readers will understand what attitude means in terms of this capstone. Secondly, the role of schools will be important to look at as a facilitator of growing students' attitudes toward the environment.

*Attitude Definition.* In order to understand the role environmental education has on attitude it is important to have a definition of the term. Attitude is defined as, “a mental position with regard to a fact or state” or a feeling or emotion toward a fact or state.” (Merriam-Webster) As Simmons (1998) noted, “Traditionally, attitude was considered to consist of three components: conative, referring to beliefs, facts, principles, knowledge, or understanding; affective, referring to emotion, feeling, or emotional evaluation; and conative , referring to behavioral tendency or intent (Gray, Borden, and Weigel, 1985).” Eventually Fishbein and Ajzen split the conation component in two separate parts because

they felt that conation should apply to behavioral intentions, whereas behavior would be observed overt acts. Zimbardo and Lieppe (1991) expanded the definition even further “... by introducing the idea of an attitude system, where attitude is affected by four interacting components: behavior, behavioral intentions, cognitions, and affective responses (See Figure 1).” (p. 9)

**Figure 1: Attitude System**



*Role of Environmental Education.* Environmental awareness took off in the United States during the 1970s at the same time that a nationwide environmental movement was taking place. The United States was not alone in this movement, with other countries focusing on the pressing environmental issues of the time, the United Nations also began to focus on environment. According to Simmons (1998), the U.N. Conference on Environment and Development adopted action plan “Agenda 21” to focus on increasing environmental education in order to reach their goal of a sustainable future. Agenda 21 defined the role environmental education should play in the following two points:

- Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development problems.
- Both formal and in-formal education are indispensable to changing people's attitudes to help them gain the capacity to assess and address their sustainable development concerns (N.B. Dept. of Education, 1994).

The state of Minnesota also values environmental education. A program was created named *A GreenPrint for Minnesota: State plan for environmental education*. It contains information on

environmental curriculum to be used in schools across the state. All three editions of the curriculum center around the following statement:

Although an understanding of ecological systems is essential to, and the basis of, a good environmental program in Minnesota, environmental education is viewed as more than just science education. An environmentally educated citizen must not only understand the scientific basis of an issue or concept, but must also know how social systems interface with environmental issues and be willing to take action as a responsible citizen. (p.2)

*The GreenPrint for Minnesota* argues that Minnesota needs environmentally literate citizens. The literature explains that to be considered environmentally literate a person must:

understand the complexity of natural and social systems and their interrelationships, demonstrate the knowledge, skills, attitudes, motivation, and commitment to work individually and collectively toward sustaining a healthy natural and social environment and have the capacity to perceive and interpret the health of environmental and social systems and take appropriate action to maintain, restore, or improve the health of those systems (p.3)

However, while the state of Minnesota prides itself on being environmentally friendly, the environmental knowledge of many Minnesotans is less impressive. According to *The GreenPrint for Minnesota* “60% of Minnesota adults believe that they are knowledgeable about environmental issues and problems, yet only 47% of the state’s adults have above-average knowledge about the environment. Only 11% received an A grade” (p. 3).

In Canada, Ruth Simmons conducted an experiment about the effect that an elective environmental education course would have on the attitudes of the students enrolled in the course. Comparing the students enrolled in the elective environmental course to the school at large, she found

that the students enrolled in the elective had a more positive attitude toward the environment. The study lasted from September to May and Simmons (1998) reported that:

Overall attitudes toward the environment did not change significantly over the school year, although there was some positive movement within certain areas, especially cognitions and behavior. Items that had the largest positive shift in attitude for both groups concerned recycling. There was no evidence to indicate that completion of the course was related to attitude change. The stronger pro-environmental stance exhibited by the environmental science students was probably related to their interest in the environment and therefore the reason for choosing to take the course. (p. 1)

These beliefs are not only seen in higher education but can extrapolated to elementary school settings, too. Sonja Skelly conducted a survey of third graders to see the effect tending to a school garden would have on their attitude toward the environment. The study had three types of gardens, low-intensity combination, medium and low intensity flower beds and medium and high intensity vegetable beds. The students with the highest level of environmental attitude were students who worked on flower bed gardens. Of course the fact that she did not have a group of non-gardening students must be acknowledged; yet overall, the leap in attitude that the students made cannot be mitigated by the lack of a control group. While the study shows that school gardens increase a positive environmental attitude a control group will only add to these findings (2000 p. 102).

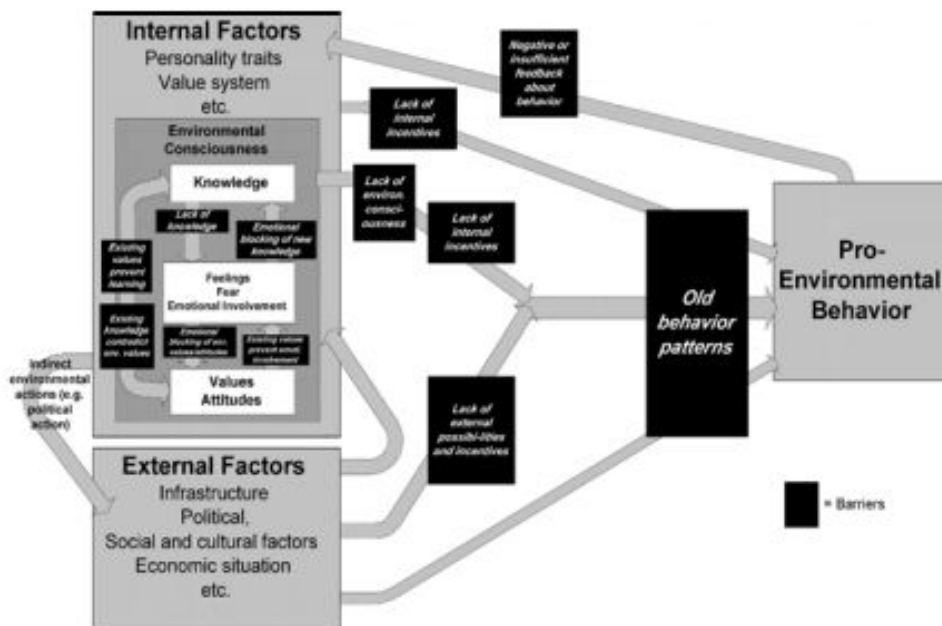
*Environmental Psychology.* In the 1960s the field of environmental psychology was established. It looks at the important question of “why do people act environmentally and what are the barriers to pro-environmental behavior?” (Kollmus and Agyeman, 2002, p. 240) An early thought in regards to the connection between people and the environment was the Early US Linear Model, in which it was



“assumed that educating people about environmental issues would automatically result in more pro-environmental behavior.” (Kollmus and Agyeman, 2002, p. 240) This is a huge issue because today most environmental groups still use the tactic of spreading vast amount of knowledge, hoping that the more educated someone is, the more likely they will be to make positive changes toward their impact on the environment. In fact Kollmus and Agyeman (2002) argue that researchers must take into account the attitude-behavior measurement, which looks at how certain behaviors are related to one another. An example they give is someone’s attitude toward driving and their attitude toward climate change. People who are concerned about climate change still drive, that is because their attitude is not closely related to their behavior, which is driving.

The gap between attitude and behavior have three main obstructions: individuality, responsibility and practicality. If a person does not have a strong concern for the environment, other needs and wants will take over that concern, such as using mass amounts of fossil fuels to fly in an airplane because they feel the need to relax under the sun in a tropical location. Some people feel like they do not have to take responsibility because they believe they have no influence in the outcome-their efforts become a moot points if their neighbor still has a giant SUV. Finally, the last argument is that people are constrained due to society and institutions. Because things are not yet practical, something that would result in a lack of time, money or information people would be less likely to act in a pro-environmental fashion. (See Figure 2) (Kollmus and Agyeman, 2002, p. 247)

**Figure 2: Model of pro-environmental behavior**



However there are some factors that have been shown to reveal influence over pro-environmental attitude and positive behavior toward the environment. Those two factors are gender and years of education, which may seem ironic since studies have shown that education and knowledge alone do not create a change in attitude. Women have less information in regards to the environment yet they are “more emotionally engaged, show more concern about environmental destruction, believe less in technological solutions, and are more willing to change. (Kollmus and Agyeman, 2002, p. 248) Researchers also believe that women are more likely to have pro-environmental attitudes because of “gender socialization in the form of girls’ greater ability to take the role of another and sense of social responsibility.” (Chawla, 2009, p. 10)

It is interesting to look at some factors, such as cultural or economic, that result in pro-environmental behaviors without that being the primary motivating issue. Many people would like to save money because money equates to freedom: freedom of choices to spend their money on other

things such as vacations, gifts or other wants. People buy appliances that run more efficiently, use less water and energy, because it is a way to save money. However, at the same time they made a purchase that ultimately was good for the environment. Hybrid purchases have gone up because they do not need gas at the same rate as non-hybrid cars do. Again, a economically motivated purchase at the end of the day ends up having a positive effect on the environment, even though that was not the motivating factor of the behavior.

Cultural factors come into play as well. It is seen as desirable to people's health to consume organic foods and use all-natural products on the human body such as soaps, lotions and shampoos. Buying products with natural and organic ingredients is motivated by culture yet the environmental benefits anyway.

Values must also be looked at when it comes to people's attitudes toward the environment. Values help influence people's intrinsic motivation, which has been proven to be better than extrinsic motivation for creating life-long change in attitude and behavior. Values are influenced by people and experiences. If people want to have a more positive environmental attitude, research has shown that they must have more childhood experiences in nature. The first experiences involve free-play and unstructured exploration of nature. Later on in childhood, those experiences would become more structured and formal such as in science class, and through scouting organizations and camps. During adolescence, friends have a large amount of influence over pro-environmental behavior and finally in adulthood, one of the strongest experiences that shape environmental values is pro-environmental organizations such as the Sierra Club or World Wildlife Fund (Chabla, 2009).

## **Summary of Chapter Two**

This chapter reviewed the literature on project-based learning, taking a specific look at Genius Hour. The literature affirms that the information is relevant to my research question. This chapter also looked at attitudes about the environment. Studies show that students who participate in environmentally focused activity generally have a more positive outlook on the environment. The fourth section talked about motivation and the research continues to support the idea that intrinsic motivation is the way to insure long lasting desired results, whether it be in business or in schools. All of the information allowed me to better understand the factors that contribute to someone changing their attitude toward a topic. I can use the information from chapter two to detail my research methods in chapter three.

## **Preview of Chapter Three**

The next chapter explains my research for this capstone. The first section will discuss the location of the study. The second section will examine the participants of the study. The third section will focus on the timeline of the capstone while the last section will focus on my research method and the analysis of the data.

## CHAPTER THREE

### Methods

#### Introduction

A huge part of the study of humans is motivation and why people choose to behave the way they do. Daniel Pink writes that humans evolved from their earliest motivation, of survival- to their current drive of seeking reward for desired behavior (Pink, 2009). Humans do not find comfort in choices, quite the opposite; people find comfort in routine and what is known. This is why it is so hard to break a habit whether it be smoking, eating or social media use.

#### Overview

In this chapter I will outline the methods used to collect data to answer the research question, *will an environmental focused Genius Hour affect students' attitudes toward the environment?* The chapter will explain the strategies used for implementation, a rationale for the type of methodology used, a description of the participants involved and the setting at which this study took place.

#### Setting

This genius hour project is intended for students enrolled in my freshman year Honors Civics and Citizenship course at a south metro Minnesota public school. The population of the school is 1,648. The racial breakdown of students consists of 56% White, 19% Black, 15% Hispanic, 5% Asian and 4% two or more races. 36% of the student population receives free or reduced lunch and 16% of students receive special education services while 3% are English Learners. The high school is located in a city with a population of 51,957, at the time of the study, and a median household income of \$80,609, which is above the median MN state income.

## **Participants**

22 students enrolled in Honors Civics and Citizenship participated in this study. Of those 22 students, all were in their freshman year. Nine of the students were female, while 12 were male and one chose not to respond. 16 of the students identified as White, one identified as Asian, one identified as Native Hawaiian and Other Pacific Islander, three identified as Two or More Races and one student chose not to respond. Four students identified as Hispanic while 15 identified as not Hispanic and three students chose not to respond. Two students identified their place of residence as in an urban setting, 20 identified it as in a suburban setting. When asked the average amount of hours spent outside per week three students responded 0-4 hours, nine responded 5-9 hours, five students responded 10-14 hours and five students identified 15 plus hours per week. The classroom is less diverse than the overall high school population that they belong to. A passion project was a part of the student's curriculum for this course.

## **Methods**

**Timeline.** In the third trimester of the academic calendar students will be introduced to the Genius Hour project that is apart of the Honors Civics and Citizenship curriculum. Students will choose a topic centered around environmental issues. Students will submit a pitch sheet to me about the topic of their choice to make sure it fits the parameters of the assignment and the theme. Students will be given a Likert scale-survey prior to the start of their research. About seven hours of research will take place in the classroom on top of the time they will do outside of class. Students will write a research paper about their environmental topic and create a method of presentation to share their findings with their classmates and teacher. Once students have

finished their Genius Hour project they will take the same Likert scale-survey as they did at the start of their Genius Hour project.

**Data Collection Techniques.** Data collected for this research will be a combination of qualitative and quantitative data, coming from surveys. Both sets of data will be analyzed separately; however both will work harmoniously together to gain important insight into the students and their attitudes toward the environment.

*Likert Scale* Students will be completing a Likert scale survey to measure their attitudes toward the environment. Likert scales ask those in a study to respond to certain statements by choosing one of five possible answers ranging from strongly agree to strongly disagree. Researchers can assign point values to the five different responses so they can easily analyze the data later. (Mills, 2018, p. 136) Researchers can also use the numeric point values to interpret the students' feelings toward certain questions or statements on the survey. Students took the New Ecological Paradigm (NEP) Likert Scale before they began research on their Genius Hour project and when they completed their Genius Hour project, approximately six months apart. The New Ecological Paradigm (NEP) Scale "is used extensively in environmental education, outdoor education, and other realms". (Anderson, 2012, p. 261) Since it is used throughout environmental education it seems fitting that I would use it in my research to answer my question in regards to students' attitudes toward the environment.

*Student Interest Survey.* Students will complete an interest survey three times throughout the 12 week project. The survey will serve many purposes. It will compare students level of interest in their environmental topic to their interest in the entire project.

**Research Methods.** My research will be conducted using the mixed-methods approach as it “provides a more complete understanding of a research problem than either [qualitative or quantitative] approach alone.” (Caswell, 2014, p. 32) Quantitative research utilizes data that can be measured while qualitative research “involves emerging questions and procedures, data typically collected in the participant’s setting...and the researcher making interpretations of the meaning of the data.” (Caswell, 2014, p.32) The quantitative data in this research study will be found in the form of the Likert Scale while the quantitative data will be found in the student interest survey done throughout the study.

### **Summary**

A mixed-method research study will be used to examine the attitudes of 22 students enrolled in Honors Civics and Citizenship regarding their Genius Hour projects. These students attend a South metro school with a population of 1,648, with the three largest race groups being White, Black and Hispanic with 36% of the student body receiving free or reduced school lunch. Students will be completing a Likert Scale survey along with surveys throughout their Genius Hour project.

### **Preview**

The next chapter will be center around the results of the study. Chapter four will include the quantitative and qualitative data that was collected using the Likert scale surveys and student interest surveys. The chapter will include an analysis and interpretation of the data. The analysis will focus on any patterns found within the data while the interpretation will help answer the research question on whether an environmental focused Genius Hour will affect students’ attitudes toward the environment.



## CHAPTER FOUR

### Results

#### Introduction

This research was conducted during an eight week period during the spring of 2018. The purpose of the research was to measure students' attitudes toward the environment, before and after an environment themed Genius Hour, to see if a change in attitude occurred. Chapter four will review the methodology used to compile data and will also provide results and interpretation.

The research study collected some qualitative data through student interest surveys and quantitative data through the NEP (New Ecological Paradigm) Likert scale survey and the student interest surveys. Students took the 15 question NEP Likert scale survey before they participated in their passion project (see Appendix B). Students then took the same 15 question NEP Likert scale survey after they had completed all steps of the passion project eight weeks later. The data collected from the Likert scale and the student interest surveys will be analyzed. This chapter will examine the results of the data, looking at the results as it relates to the research question *will an environmental focused Genius Hour affect students' attitudes toward the environment?* In conclusion, chapter 4 will provide a summary of the research study and the results.

#### Review of Study and Data Collection Tools and Methods

Twenty-two students 9th grade Honors Civics and Citizenship students, enrolled in a Midwest suburban high school completed an environmental passion project. Those students were granted permission to participate in the study by their parent or guardian (Appendix A) and also

completed a pre and post NEP likert scale survey and four student interest surveys throughout the eight week research period. Of those 22 students, all of whom were in their freshman year, nine of the students were female, while 12 were male and one chose not to respond. 16 of the students identified as White, one identified as Asian, one identified as Native Hawaiian and Other Pacific Islander, three identified as Two or More Races and one student chose not to respond. Four students identified as Hispanic while 15 identified as not Hispanic and three students chose not to respond. Two students identified their place of residence as in an urban setting, 20 identified it as in a suburban setting. When asked the average amount of hours spent outside per week three students responded 0-4 hours, nine responded 5-9 hours, five students responded 10-14 hours and five students identified 15 plus hours per week.

The environmental themed passion projects were completed either individually or with a self-chosen partner from the same class. All groups selected their own environmental topic. A total of 16 passion projects were completed. Two projects were focused on overfishing, two other projects were focused on personal care and beauty products and two other groups examined human overpopulation. The following topics were all completed by only one group: air pollution, bees, vegetarianism, solar energy, elephants, water pollution, palm oil, noise pollution, coral bleaching and the need for wildlife diversity in relationship with humans. All groups were required to participate in six phases: a pitch sheet, research notes, research paper, evaluation sheet and a class presentation.

Quantitative and qualitative data was collected using the student interest form (see Appendix D). At four points throughout the eight week research period students completed this form. They were asked to respond to the following questions, “How do you feel right now about

your inquiry project topic?” and “Why do you feel this way at this stage in the process?” For the first question students were given five options to select from: “very little interest”, “less interest”, “neutral”, “more interest”, and “much more interest”. For the second question students had five options to choose from plus a sixth option where they could write their own response. The five options that were given to them included, “the topic never interested me in the first place”, “the topic has become harder than expected”, “the topic has become easier than expected”, “the project has become harder than expected” and “the project has become easier than expected.”

Quantitative data was obtained using the NEP Likert Scale Survey. The NEP Likert Scale Survey is widely used throughout the United States and “is probably the most widely used measure of environmental values or attitudes, worldwide” (Anderson, 2012 p. 261). The NEP Likert Scale consists to 15 questions. Each question has five possible answers for students to choose: 1=strongly disagree, 2=disagree, 3=not sure, 4=agree and 5=strongly agree. The 15 questions are broken down into five themes. “the reality of limits to growth (1, 6, 11) antianthropocentrims (2, 7, 12), the fragility of nature’s balance (3, 8, 13), rejection of exemptionalism (4, 9, 14) and the possibility of an ecocrises (5, 10, 15)” (Dunlap, Jones, Mertig & Van Liere, 2000, p.432). The Likert scale is also divided into odd and even questions. The odd questions are worded so that if a student holds a more pro-ecological viewpoint they will select one of the higher numbered options, because they agree with the statement. The opposite is true for the even numbered questions. Even numbered questions are worded so that if a student disagrees with the statement it they hold a pro-ecological viewpoint. They will choose one of the lower numbered options as their answer. Later when the data will be analyzed the data from the even numbered questions will need to be inverted (1=5, 2=4, 3=3, 4=2, 5=1) to reflect this.

### Analysis of the NEP Likert Scale Survey

Students completed the NEP Likert Scale Survey before they began work on their environment themed passion project. The NEP Likert Scale is constructed using even and odd numbered questions each worded to show different viewpoints on the environment. Odd numbered questions are worded so that the more a person agrees with the statement, the higher the score they will select, meaning this person has a more pro-ecological worldview. Even numbered questions are worded so that the more a person agrees with the statement, the lower the score they will select, meaning this person has a more pro-ecological worldview.

Table 1: NEP Likert Scale Survey Data-Pre Passion Project

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1. "We are approaching the limit of the number of people the Earth can support"	0	3	10	7	2
2. "Humans have the right to modify the natural environment to suit their needs"	2	6	4	8	1
3. "When humans interfere with nature it often produces disastrous consequences"	0	1	2	13	6
4. "Human ingenuity will insure that we do not make the Earth unlivable"	1	3	14	3	1
5. "Humans are	0	2	2	11	7

seriously abusing the environment"					
6. "The Earth has plenty of natural resources if we just learn how to develop them"	0	3	2	7	10
7. "Plants and animals have as much right as humans to exist"	0	0	2	12	8
8. "The balance of nature is strong enough to cope with the impacts of modern industrial nations"	5	9	7	1	0
9. Despite our special abilities, humans are still subject to the laws of nature"	0	0	3	14	5
10. "The so-called "ecological crisis" facing humankind has been greatly exaggerated"	2	8	11	1	0
11. "The Earth is like a spaceship with very limited room and resources"	0	3	4	13	2
12. "Humans were meant to rule over the rest of nature"	5	7	8	2	0
13. "The balance of	0	2	3	14	3

nature is very delicate and easily upset"					
14. "Humans will eventually learn enough about how nature works to be able to control it"	1	6	10	5	0
15. "If things continue on their present course, we will soon experience a major ecological catastrophe"	0	1	4	9	8

In the pre NEP Likert Scale Survey the 22 students averaged a score of 4 or higher on the following questions: three “when humans interfere with nature it often produces disastrous consequences”, seven “plants and animals have as much right as humans to exist”, nine “despite our special abilities, humans are still subject to the laws of nature” and 15 “if things continue on their present course, we will soon experience a major ecological catastrophe.” With high scores on these questions, it is clear that the students have an awareness of the role humans play in our environment, and that many times it is negative.

The 22 students also had an average of 2.1 on question six, “The Earth has plenty of natural resources if we just learn how to develop them.” Low scores on even numbered questions reveal a more pro-ecological worldview. Question six also deals with humans and their relationship with nature, which is consistent with the class views previously seen in the odd

numbered questions. However this shows that students feel that humans can solve the environmental issues of today.

The 22 students also revealed they hold low ecological views in their pre NEP Likert Scale Surveys. The average class score for number 1, “We are approaching the limit of the number of people the Earth can support” was 3.4, and number 4, “Human ingenuity will insure that we do not make the Earth unlivable” was 3. These questions show that the students feel that while humans can have a negative effect on the environment, they believe that they are also capable of doing good. These questions also reveal the the students believe that the Earth is still able to provide the basic needs that humans have in terms of a place to live and natural resources.

Table 2: NEP Likert Scale Survey Data-Post Passion Project

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
1. "We are approaching the limit of the number of people the Earth can support"	1	1	5	9	6
2. "Humans have the right to modify the natural environment to suit their needs"	4	5	8	4	1
3. "When humans interfere with nature it often produces disastrous consequences"	0	2	3	7	10
4. "Human ingenuity will insure that we do not make the Earth unlivable"	1	5	14	1	1

5. "Humans are seriously abusing the environment"	0	1	2	8	11
6. "The Earth has plenty of natural resources if we just learn how to develop them"	1	1	6	9	5
7. "Plants and animals have as much right as humans to exist"	0	1	4	5	13
8. "The balance of nature is strong enough to cope with the impacts of modern industrial nations"	8	8	4	2	0
9. Despite our special abilities, humans are still subject to the laws of nature"	0	1	4	9	8
10. "The so-called "ecological crisis" facing humankind has been greatly exaggerated"	5	9	6	1	1
11. "The Earth is like a spaceship with very limited room and resources"	1	2	4	11	4
12. "Humans were meant to rule over the rest of nature"	3	10	7	2	0
13. "The	0	1	4	11	6



balance of nature is very delicate and easily upset"					
14. "Humans will eventually learn enough about how nature works to be able to control it"	2	5	8	6	1
15. "If things continue on their present course, we will soon experience a major ecological catastrophe"	1	0	2	6	13

When comparing the pre and post NEP Likert Scale Survey scores, one can see that there was not much change in student attitude. For the purpose of this research study, significant change will consist of a 4% or higher change from the pre to post average scores. None of the 15 questions saw a percentage change of four or more. The highest percentage change was 3.4%, which was seen on question 15 "If things continue on their present course, we will soon experience a major ecological catastrophe".

Table 3: Percentage Change from Pre to Post NEP Likert Scale Surveys

NEP Question	Percentage Change
1. "We are approaching the limit of the number of people the Earth can support"	2.8%
2. "Humans have the right to modify the natural environment to suit their needs"***	1.7%
3. "When humans interfere with nature it often produces disastrous consequences"	3.1%
4. "Human ingenuity will insure that we do not make the Earth unlivable"***	1.8%
5. "Humans are seriously abusing the environment"	3.3%

6. “The Earth has plenty of natural resources if we just learn how to develop them”**	2.7%
7. “Plants and animals have as much right as humans to exist”	3.4%
8. “The balance of nature is strong enough to cope with the impacts of modern industrial nations”**	1%
9. “Despite our special abilities, humans are still subject to the laws of nature”	3.1%
10. “The so-called ‘ecological crisis’ facing humankind has been greatly exaggerated”**	1.3%
11. “The Earth is like a spaceship with very limited room and resources”	2.7%
12. “Humans were meant to rule over the rest of nature”**	1.4%
13. “The balance of nature is very delicate and easily upset”	3%
14. “Humans will eventually learn enough about how nature works to be able to control it”**	2%
15. “If things continue on their present course, we will soon experience a major ecological catastrophe”	3.4%

\*\*Even numbered questions=the lower the score, the more pro-ecological worldview

Since no significant change took place after the eight weeks of study, it can be deduced that the attitudes that students had about the environment prior to the study are strongly held beliefs that cannot be easily swayed.

The NEP Likert Scale has odd and even numbered questions, each type written in a different way. The odd numbers are worded so that the higher the score, the more pro-ecological worldview they have. The even numbers are worded so that the lower the score, the more pro-ecological worldview they have. Due to this scoring of the even numbered questions, the data had to be inverted (1=5, 2=4, 3=3, 4=2, 5=1). Then the average pre and post likert scale data was used to compare to one another.

Before students completed their passion project, they completed a student information form (see Appendix C) in which they identified on average how many hours per week they spent

outdoors (see Table 4). That information was used to see if that had any bearing on their pre and post average scores.

Table 4: Average Hours/Week Outside in Comparison with Inverted Scores

Ave. Hours/Week	Number of Students	Pre Inverted Ave. Score	Post Inverted Ave. Score	% Change from Pre to Post
0-4	3	3.7	3.8	2.7%
5-9	10	3.5	3.8	8.6%
10-14	5	3.7	3.7	0%
15+	5	3.4	3.6	5.9%

The assumption is that students who on average spend more time outside will have a more pro-environmental attitude. The NEP Likert Scale is written that if someone selects low scores for their even numbered questions, that they hold a more pro-ecological viewpoint. In order to find the average pre and post scores for the even numbered questions, the scores were inverted (1=5, 2=4, 3=3, 4=2, 5=1). Students who spend 0-4 hours per week outside saw a 2.7% change while students who reported 5-9 hours per week outside saw a 8.6% change and finally students who spend 15 and more hours outside per week saw a 5.9% change. It was interesting to note that students who reported spending 10-14 hours outside per week saw no percentage change from their pre to post inverted scores. The increase in the scores is reassuring that environment themed passion projects have a positive effect on students' attitudes but it is puzzling to see that students who reported the second highest value of hours outside per week saw no percentage change from their pre to post scores.

Finally to see overall how attitudes changed from completing an environmental themed passion project the pre average inverted score was compared to the post average inverted score

from the NEP Likert Scale Surveys (Table 5). A 5.1% change was seen from the pre to post scores, showing that overall students' attitudes were affected by a passion project with an environment theme.

Table 5: NEP Inverted Pre and Post Average Scores

Pre Average Score	53.2
Post Average Score	55.9
Percent Change	5.1%

### Analysis of the Student Interest Forms

This section of chapter four will examine the student interest surveys taken during the eight week research period. Students took the same student interest survey on four separate occasions, April 11th, April 25th, May 16th and May 31st (see Table 7). On April 11th, students had already been informed about the project instructions, expectations, selected their own topic and conducted some research before completing the student interest form (see Appendix D). By April 24th, students had completed roughly two and a half hours of independent research. By May 16th, students had finished their independent research and spent a little under two hours writing their research paper and on May 31st, students had completed the first five phases of Genius Hour (Appendix E) and were moving on to the final phase of presenting.

Table 7: Student Interest Form Question 1 Results: How do you feel right now about your inquiry project topic?

	Very Little Interest	Less Interest	Neutral	More Interest	Much more Interest
April 11th	0	3	3	13	3
April 24th	0	3	7	11	1

May 16th	0	7	7	7	1
May 31st	0	4	4	10	3

Table 8: Student Interest Form Question 1 Results: Why do you feel this way at this stage in the process?

	The Topic Never Interested Me in the First Place	The Topic has Become Harder than Expected	The Topic has Become Easier than Expected	The Project has become Harder than Expected	The Project has become Easier than Expected	Other**fill in the blank
April 11th	1	3	7	4	1	6
April 24th	2	3	7	3	3	4
May 16th	0	6	4	7	3	2
May 31st	1	2	6	3	6	4

On April 11th, students took the first student interest survey. 72% of students were either more interested or much more interested in their project topic. When looking at why students responded that way 32% of students reported that the topic had become easier than expected. The second highest number of students chose to write in their own remarks such as “There are many ways to solve pollution”, “I have not started in-depth research yet”, “I don’t know much about my topic and I would like to learn” and, “the topic is more relevant than I expected.” By April 24th, students had completed roughly two and a half hours of research and students who were more or much more interested dropped to 55%. Again, 32% of students identified that the reason they felt that way was because the topic had become easier than expected. The next time students took their student interest survey they had completed their independent research and had begun writing their research paper. At this stage we saw a big dip in students identifying that they were

more or much more interested in their project topic, with only 36% of students reporting that. 32% of student held a neutral position toward their project topic and another 32% held less interest. As to why students identified the way they did, 32% of students felt that the project had become harder and another 27% felt that the project topic had become harder. It is interesting to note that more students felt that less interest due to the project becoming harder. The last student interest survey was taken on May 31st, the day students began presenting their projects to complete phase six of the project. 59% of students felt more or much more interest in their project topic. 27% of students felt that the project had become easier and another 27% felt that the topic had become easier. Some students wrote in their own response as to why they felt the way they did including “the project is really interesting” and “there was much more impact that originally expected.” Overall, more students’ attitudes toward how they felt about their project topic was how hard they felt the project had become, not their topic.

### **Summary**

Chapter four examined and analyzed the student data collected over a eight week period using the NEP Likert Scale and student interest surveys. The research study was completed in a Honors Civics and Citizenship class during the spring of 2018. The research study measured whether an environmental focused genius hour would affect students’ attitudes toward the environment. The NEP Likert Scale Survey revealed that there was a 5.1% increase in the overall student scores (Table 5). However there was no significant change, over 5%, for any of the individual 15 NEP Likert Scale Survey questions from the pre to post survey. The student interest surveys revealed that students were 72% of students were more or more interested in their project topic at the beginning of the project timeline, then dipping down as the project

timeline continued. At the end of the project 59% of students felt more or more interest in their project topic. Most students identified that the major reasons that influenced how they felt about their project topic was how difficult they felt their project or topic had become. Overall the research study does not seem to support that an environmental themed Genius Hour affects students' attitudes toward the environment. Chapter five will examine the study's limitations and any future implications of the results.

## CHAPTER FIVE

### Conclusion

#### Introduction

Chapter five will conclude the research study on whether an environmental themed Genius Hour will affect students' attitudes toward the environment. In this chapter, the study's limitations will be addressed, in addition to future implications for research. Finally, a connection to the literature review from Chapter five will be addressed and a final reflection.

#### Literature Review Connection

In Andi McNair's (2017) book, *Genius Hour*, she argues that passion projects are some of the best ways for students to learn information in a meaningful way. Passion projects give students an opportunity to learn by doing. Application of the standards is the best way for students to gain understanding. By applying the standards, they begin to see real-world connections and understand that their learning can go beyond the walls of the classroom (p. 6). By allowing students to choose their environmental topic of their Genius Hour, they already were "buying in" to the project knowing that they had been given the freedom and choice to choose something that they genuinely interested in, usually picking something that connected to their lives.

The research study also connected to the idea of the power of education into shifting attitudes and behavior. The Early US Linear Model, in which it was "assumed that educating people about environmental issues would automatically result in more pro-environmental behavior." (Kollmus and Agyeman, 2002, p. 240) The results of this study support this argument, as none of the 15 questions in the NEP saw any significant percentage change (5%). An if the



students' attitudes were not significantly changed it can be safe to argue that no future change in behavior will occur as well, although this study did not measure behavior.

The student interest surveys revealed that students were concerned that the project had become harder than expected. That attitude toward the project may have affected how they felt about their self-selected environmental topic.

### **Limitations of the Research Study**

There were some limitations in this research study that need to be addressed. First, there were only 22 students who participate, which is not a large enough sample size. The 22 students were also in a honors course, which is accelerated and has a higher level of difficulty in regards to curriculum and expectations. Many times honors students come from families with higher levels of education and education level is a factor that have been shown to reveal influence over pro-environmental attitude and positive behavior toward the environment (Kollmus and Agyeman, 2002, p. 248). Many of these students possible already held strong environmental attitudes before completing this project. The research study took place over a eight week period of time, which could have played a role in why students felt like the project was becoming harder during certain parts of the study. The Genius Hour project also was completed during the last nine weeks of school, which could have played a factor in the students' attitudes toward the project. Data was collected using the NEP Likert Scale. Some students struggled with the vocabulary of some of the questions. The other method of data collection was through multiple choice student interest surveys, with one option to fill in the blank. Since students were not given much personal choice in their responses, some students may have felt limited in expressing their

feelings and attitudes. Using a more open ended, write-in options would allow students to give a change to provide more authentic, specific responses.

### **Future Studies on Attitude toward the Environment**

Future studies should look at the correlation between a student's attitude and their behavior. While students in the study saw some percentage increase in their overall NEP Likert Scale scores there is little to support that the students' behavior and choices in their personal life will change as well. Kollmus and Agyeman (2002) argue:

That researchers must take into account the attitude-behavior measurement, which looks at how certain behaviors are related to one another. An example they give is someone's attitude toward driving and their attitude toward climate change. People who are concerned about climate change still drive, that is because their attitude is not closely related to their behavior, which is driving (p 240).

Future studies should also include a wider range of student ages and multiple level of classes, not just honors or advanced courses. Additionally, future studies could examine how a passion project with a required action plan, such as completing some type of service, would affect students' attitudes in comparison to a passion project with no service aspect.

### **Reflection**

Environmental Education seeks not only to change people's attitudes toward the environment but also their behaviors and choices in regards to the effects it has on the environment. It is important to remember that more education does not mean more change. The goal of this research study was to see if a environment themed Genius Hour passion project affected the students' attitude toward the environment.

The results of this study partially supports that an environmental themed Genius Hour affects students' attitudes. The students in this study had a variety of experience spending time outdoors with the majority of the students living in a suburban area. At the beginning of the research study 72% students were more or much more interested in their self-selected environment topic however at the end of the research study it had dropped down to 59%.

Overall, the research study provides an excellent framework of data to begin further analysis. By completing this project, students learned to produce a multi-step, student driven project using multiple skills that will benefit them throughout their schooling. While the overall student scores changed a little, there was not significant change in any of the NEP Likert Scale questions. Some students may have found this project simply another school requirement, while others may have found this project as a gateway to a more environmentally focused way of thinking about the world. For the past four years students have been required to complete a Genius Hour project as part of the class curriculum. For this academic year, students were required to choose an environmental themed topic in comparison to previous years when students could have chosen any topic they were interested in. In the future, students will be given the choice to choose any topic again.

### **Summary**

In this chapter, the study's limitations were addressed, in addition to future implications for research. A connection to the literature review from Chapter five was addressed and a final reflection was made. This research study did little to suggest that an environmental themed Genius Hour can affect students' attitudes toward the environment. This study does demonstrate

the need for further studies on the impact of environmental themed passion projects on students' attitudes toward the environment.

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## Appendix A

March 21, 2018

Dear Parent or Guardian,

I am your student's Honors Civics and Citizenship teacher and a graduate student working on an advanced degree in education at Hamline University, St. Paul, Minnesota. As part of my graduate work, I plan to conduct research in my classroom from March 2018 - June 2018. The purpose of this letter is to ask your permission for your student to take part in my research.

I want to study how student participation in an environmental inquiry project affects their attitude toward the environment. Students will be working to complete an environmental inquiry project of their choice. The student-led inquiry project allows for students to examine an issue (of their choice) in today's society in regards to the environment, conduct research, propose a solution and work with experts and ultimately, bring awareness to an environmental issue that is important to them. My research will measure students' progress through surveys and interviews.

There is little to no risk for your child to participate. All results will be confidential and anonymous. I will not record information about individual students, such as their names, nor report identifying information or characteristics in the capstone. Participation is voluntary and you may decide at any time and without negative consequences that information about your child will not be included in the capstone.

I have received approval for my study from the Hamline University IRB and from the principal of Apple Valley High School. The capstone will be catalogued in Hamline's Bush Library Digital Commons, a searchable electronic repository. My results might also be included in an article for publication in a professional journal or in a report at a professional conference. In all cases, your child's identity and participation in this study will be confidential.

If you agree that your student may participate, keep this page. Fill out the duplicate agreement to participate on page two and please return to me no later than April 4th, 2018.

If you have any questions, please email or call me at school.

Sincerely,

Claire Opsahl

(952) 431-8200

[claire.opsahl@district196.org](mailto:claire.opsahl@district196.org)

## Appendix A

### Informed Consent to Participate in Quantitative and Qualitative Data Collection

**Keep this full page for your records.**

I have received your letter about the study you plan to conduct in which you will measuring students attitudes in response to an environmental inquiry project. I understand there is little to no risk involved for my child, that his/her confidentiality will be protected, and that I may withdraw or my child may withdraw from the study at any time.

\_\_\_\_\_  
Student's Name (Print)

\_\_\_\_\_  
Parent/Guardian Name (Print)

\_\_\_\_\_  
Parent/Guardian Signature

\_\_\_\_\_  
Date

**Participant copy**

Informed Consent to Participate in Quantitative and Qualitative Data Collection

**Please return this copy to Ms. Opsahl by April 4, 2018**

I have received your letter about the study you plan to conduct in which you will measuring students attitudes in response to an environmental service-learning project. I understand there is little to no risk involved for my child, that his/her confidentiality will be protected, and that I may withdraw or my child may withdraw from the study at any time.

---

Student's Name (Print)

---

Parent/Guardian Name (Print)

---

Parent/Guardian Signature

---

Date

**Researcher Copy**

## Appendix B

### NEP Likert Scale Survey

#### Revised NEP Likert Scale Survey

1= Strongly Disagree

2= Disagree

3= Not Sure

4= Agree

5= Strongly Agree

1. We are approaching the limit of the number of people the Earth can support.

1                      2                      3                      4                      5

2. Humans have the right to modify the natural environment to suit their needs.

1                      2                      3                      4                      5

3. When humans interfere with nature it often produces disastrous consequences.

1                      2                      3                      4                      5

4. Human ingenuity will insure that we do not make the Earth unlivable.

1                      2                      3                      4                      5

5. Humans are seriously abusing the environment.

1                      2                      3                      4                      5

6. The Earth has plenty of natural resources if we just learn how to develop them.

1                      2                      3                      4                      5

7. Plants and animals have as much right as humans to exist.

1                      2                      3                      4                      5

8. The balance of nature is strong enough to cope with the impacts of modern industrial nations.

1                      2                      3                      4                      5

9. Despite our special abilities, humans are still subject to the laws of nature.

1                      2                      3                      4                      5

10. The so-called “ecological crisis” facing humankind has been greatly exaggerated.

1                      2                      3                      4                      5

11. The Earth is like a spaceship with very limited room and resources.

1                      2                      3                      4                      5

12. Humans were meant to rule over the rest of nature.

1                      2                      3                      4                      5

13. The balance of nature is very delicate and easily upset.

1                      2                      3                      4                      5

14. Humans will eventually learn enough about how nature works to be able to control it.

1                      2                      3                      4                      5

15. If things continue on their present course, we will soon experience a major ecological catastrophe.

1                      2                      3                      4                      5

---

*\*source (Anderson, 2012)*

## Appendix C

### Student Information

1. Gender
  - a. Male
  - b. Female
  - c. Other
  - d. I choose not to answer
2. Please specify your race.
  - a. White
  - b. Black or African American
  - c. American Indian and Alaska Native
  - d. Asian
  - e. Native Hawaiian and Other Pacific Islander
  - f. Two or More Races
  - g. I choose not to answer
3. Please specify your ethnicity.
  - a. Hispanic or Latino
  - b. Not Hispanic or Latino
  - c. I choose not to answer
4. Where is your permanent residence?
  - a. Urban
  - b. Suburban
  - c. Rural
5. What is the average amount of hours you spend outdoors per week?
  - a. 0-4
  - b. 5-9
  - c. 10-14
  - d. 15+

## Appendix D

### Student Interest Form

1. How do you feel right now about your inquiry project topic?

- a. Very little interest
- b. Less interest
- c. Neutral
- d. More interest
- e. Much more interest

2. Why do you feel this way at this stage in the process?

- a. The topic never interested me in the first place
- b. The topic has become harder than expected
- c. The topic has become easier than expected
- d. The project has become harder than expected
- e. The project has become easier than expected
- f. Other: \_\_\_\_\_

## Appendix E

### Genius Hour

**Due Thursday, May 31st, 2018**

During trimester 3, you will conduct research on a topic of your choice in order to create a project and propose a solution.

#### ***What is Genius Hour?***

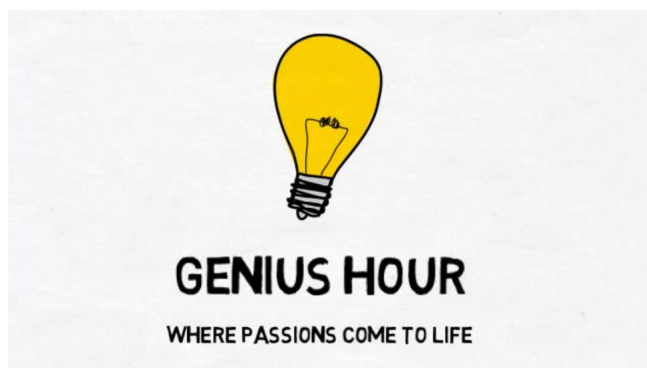
Genius hour is an opportunity for you, the student, to choose what and how you will learn about a particular topic or issue that you are passionate about. There are only 3 requirements for the work that you do during genius hour.

1. You must respond to the guiding target.
2. Your project must be researched.
3. You must share your work with the entire world.

Identify an issue.  
Propose a solution

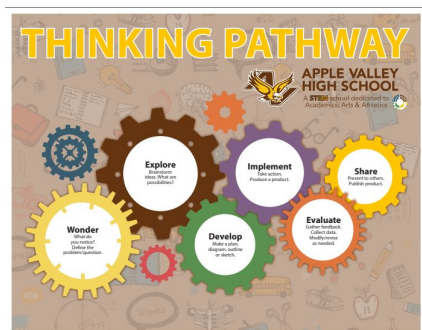
#### ***Details of the project:***

- You may work alone or with a partner (teams will sign a contract and will earn the same grade so choose wisely).
- You will receive 17 days of in class work time to complete all phases of the project (see attached sheet for in class work dates). It is HIGHLY encouraged to use weekends to work ahead or catch up.
- You will be graded at the completion of each phase (see below for dates).
- Your project is worth 10% of your trimester grade.





### *Phases of the Project:*



**Wonder:** What environmental issue are you curious to learn more about? What environmental issue interests you?

*\*Remember, all topics need to be approved by your teacher and filled out on the “pitch form”. The more specific your topic, the more likely it will be approved.*

**Explore:** What research is needed to understand this issue more?

**Develop:** What is your research project? How will you demonstrate a deeper understanding of the issue?

**Implement:** Produce a project as your solution to the issue

**Evaluate:** Gather feedback, modify/revise, share with classmates for constructive criticism

**Share:** Present to others

Phase	What is required?	Date
<b>Wonder</b>	Pitch sheet	Thursday, April 5th
<b>Explore</b>	Resource analysis sheets	Tuesday, May 8th
<b>Develop</b>	Research paper	Tuesday, May 22nd
<b>Implement</b>	Solution project (column 2 project)	Tuesday, May 29th
<b>Evaluate</b>	Completed evaluation form	Wednesday, May 30th
<b>Share</b>	Present and turn in final projects	Thursday, May 31st

***Final projects:***

Pick one project from each column:

Research Project	Solution Project Options
Formal research paper	Newspaper editorial Public Service Announcement Write a letter to a politician Speak at a town hall or city/school meeting Present to local civic organization Organize a flyer campaign Organize a fundraiser Volunteer (provide specifics) Form a club Circulate a petition Write and perform a song/dance Invite a guest speaker Multiple morning announcements Organize a rally Create a product in the Fab Lab Create some type of reading material Podcast Create a model representation Propose a plan for construction Business plan Intern/shadow an expert

## Appendix F

## Genius Hour Planning Sheet

Date	Phase	What was accomplished?	What needs to be worked on for next time?
Wed. March 21st	<b>Wonder:</b> introduce project and think about possible topics.		
Wed. April 4th (Digital learning day from home)	<b>Wonder:</b> Fill out “pitch forms” to have topic approved.		
Wed. April 11th	<b>Explore:</b> research (find 2 more sources)		
Thurs. April 12th	<b>Explore:</b> research (find 2 more sources)		
Wed. April 18th	<b>Explore:</b> research (find 2 more sources)		
Wed. April 25th	<b>Explore:</b> research (find 2 more sources)		
Thurs. April 26th	<b>Explore:</b> research (find 2 more sources)		
Wed. May 2nd	<b>Explore/ Develop:</b>		

	research (find 2 more sources) or begin project		
<b>Any incomplete research needs to be completed at home during the weekend (May 5 and 6)</b>			
Wed. May 9th	<b>Develop:</b>		
Thurs. May 10th	<b>Develop:</b>		
<b>Catch up/move ahead by working at home during the weekend (May 12 and 13)</b>			
Wed. May 16th	<b>Develop:</b>		
<b>Catch up/move ahead by working at home during the weekend (May 19 and 20)</b>			
Wed. May 23rd	<b>Develop/ Implement:</b>		
Thurs. May 24th	<b>Implement:</b>		
<b>Anything that remains to be completed this weekend (May 26 and 27)</b>			
Tues. May 29th	<b>Evaluate:</b> gather feedback from classmates		
Wed. May 30th	<b>Evaluate:</b> make any adjustments to projects based on feedback		

Thur. May 31 and Friday June 1st	<b>Share:</b> presenting in class		
<b>GENIUS HOUR DUE Thursday May 31st</b>			

**Appendix G**

Student Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Pitch Checklist**

Directions: Please include the following information when completing this form. You must include.

Project Title (the issue you will focus on)

KWH

K – What do you already know about this issue?

W – What do you want to know about this issue?

H – How are you going to find out what you would like to know about this issue?

Why did you choose this issue?

How can your peers support you as you work on your project?

What do you hope to create as a product to represent your project?

**Pitch Form**

1. Project Title: \_\_\_\_\_

2. K – What do you already know?

---

---

---

3. W – What do you want to know?

---

---

---

4. H – How are you going to find out?

---

---

---

5. Why did you choose this issue? \_\_\_\_\_

---

---

---

6. What do you hope to create as a product to represent your project? \_\_\_\_\_

**Appendix H**

## Resource Analysis Sheet

Source: \_\_\_\_\_

Notes:

---

MLA Citation:



**Appendix I**

Student Name: \_\_\_\_\_

Date: \_\_\_\_\_

## Evaluation Form

Project Topic: \_\_\_\_\_

Student (s) Presenters: \_\_\_\_\_

What part(s) of the presentation/project did you enjoy the most as an audience member?

What part(s) of the presentation/project did you think was done the best?

What part(s) of the presentation/project need more improvement?

## Appendix J

	Meets (10)	Approaching (9-8)	Emerging (7)	Does Not Meet (6)	No Attempt (0)
<b>Wonder</b>					
Pitch Sheet	Student fully completes pitch sheet	Student fills out the majority of the pitch sheet	Student partially fills out the pitch sheet	Student minimally fills out the pitch sheet	Student does not fill out pitch sheet
Total	_____ /10				
<b>Explore</b>					
Research Analysis Sheets	Student completes 12 research analysis sheets	Student completes 10-11 research analysis sheets	Student completes 8-9 research analysis sheets	Student completes 6-7 research analysis sheets	Student completes less than 6 research analysis sheets
Expert Interview	Expert interview is conducted and documented				Expert interview is not conducted or documented
Participation	Student utilizes all in class work time and remains fully engaged during class	Student utilizes most of in class work time and mostly remains engaged during class	Student inconsistently uses in class work time and is inconsistently engaged during class	Student poorly uses in class work time and is not engaged during class	Student does not use in class work time
Total	_____ /30				
<b>Develop</b>					
Content	Covers topic in-depth with details and examples.  Subject knowledge is excellent.	Includes essential knowledge the topic.  Subject knowledge appears to be good.	Includes less than essential information about the and/or there are some factual errors.	Content is minimal and/or there are several factual errors about the topic	No content is included
In-Text Citations	All in text citations are MLA with proper formatting	Most in text citations are MLA with proper formatting	Many in text citations are MLA with proper formatting	Minimal in text citations are MLA with proper formatting	No in text citations
Bibliography	Completed in MLA with proper formatting	Mostly completed in MLA with proper formatting	Partially completed in MLA with proper formatting	Minimally completed in MLA with proper formatting	No bibliography
Paper Format	Paper is double spaced, 12-point font, Times New Roman				Paper does not meet expectations
Paper Length	At least 750 words	At least 625 words	At least 500 words	Less than 375 words	250 words or less
Participation	Student utilizes all in class work time and remains fully engaged during class	Student utilizes most of in class work time and mostly remains engaged during class	Student inconsistently uses in class work time and is inconsistently engaged during class	Student poorly uses in class work time and is not engaged during class	Student does not use in class work time
Total	_____ /60				

<b>Implement</b>					
Solution Project	Student completes one of the solution project options.  The project is completed with high quality and effort	Student completes one of the solution project options.  The project is well done with quality and effort	Student completes one of the solution project options.  The project is inconsistent in quality and effort	Student completes one of the solution project options.  The project is completed with minimal quality and effort	Student does not complete a solution project
Participation	Student utilizes all in class work time and remains fully engaged during class	Student utilizes most of in class work time and mostly remains engaged during class	Student inconsistently uses in class work time and is inconsistently engaged during class	Student poorly uses in class work time and is not engaged during class	Student does not use in class work time
Total	/40 (20 x 2)				
<b>Evaluate</b>					
Evaluation Forms	Student fully completes evaluation forms and uses feedback to modify/revise	Student completes the majority of the evaluation forms and uses feedback to modify/revise	Student partially completes evaluation forms and uses feedback to modify/revise	Student minimally completes evaluation forms and uses feedback to modify/revise	Student does not complete evaluation forms
Participation	Student utilizes all in class work time and remains fully engaged during class	Student utilizes most of in class work time and mostly remains engaged during class	Student inconsistently uses in class work time and is inconsistently engaged during class	Student poorly uses in class work time and is not engaged during class	Student does not use in class work time
Total	/20				
<b>Share</b>					
Presentation	Student presents their issue to the class along with their findings, solutions and next steps. Presentation lasts 6 minutes	Student presents their issue to the class along with their findings, solutions and next steps. Presentation lasts 3-4 minutes	Student presents their issue to the class along with their findings, solutions and next steps. Presentation lasts 2 minutes	Student presents their issue to the class along with their findings, solutions and next steps. Presentation lasts 1 minutes	No oral presentation is given
Total	/40 (10 x 4)				
Genius Hour Total	/200				